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Genetic Variability in F_2 and F_3 of Bitter Gourd

Key words : BDMV, Bitter Gourd,Genetic Advance, Heritability.

Bitter Gourd (*Momordica charantia* L.) is one of the important vegetable crops of Kerala. The fruits are rich in Vitamin C (88mg/kg) and Iron (1.8mg/kg). The fruits have a prominent role in the diet of diabetic patients as it has low sugar content. Incidence of pests and diseases is the most important production constraint of bittergourd cultivation (Jayapalan and Sushama, 2001). Among the diseases, bittergourd distortion mosaic caused by Bittergourd Distortion Mosaic Virus is a serious problem affecting cultivation during summer. Conventional plant protection measures for vector control are inefficient and have undesirable effects. Genetic improvement in bitter gourd, especially with focus on mosaic resistance has been conducted only to a limited extent in India. Therefore the present study was carried out to understand the genetics of yield and resistance to mosaic virus.

Seeds from F_1 plants of three crosses IC 68335 X Preethi , IC 68263 B X Preethi and IC68250 X IC 68342 B (Table 1) from a previous screening experiment formed the materials for the study. Selfed seeds of the selected crosses and their parents were raised in randomized block design with three replications as per the package of recommendations of Kerala Agricultural University.In each replication seventy five plants were raised in both F_2 and F_3 generations and observations were recorded on all the plants. No plant protection measure was adopted to ensure adequate vector population. Selfing in F_2 plants was observed by bagging the individual flowers and collecting the pollen from male flower and dusting on the stigma of the female flower of the same plant. The selfed seeds were used to raise the F_3 generation and observations were recorded on days to anthesis of male and female flowers per plant, sex ratio, fruit weight, fruit girth, fruit length, fruit yield per plant, BDMV incidence and severity and fruit colour and analysed.. The PCV and GCV values were classified as low (0-10%), medium (10-20%) and high (>20%) as suggested by Sivasubramanian and Menon (1973). Heritability estimates were categorized as low (0-30%), medium (30-60%) and high (>60%) and the range of genetic advance was classified as low (00-10%), medium (10-20%) and high (>20%) (Johnson *et al.*, 1955).

A wide range of variation was noticed for all the characters studied among the parents and segregants in F_2 and F_3 generation (Table 2). Maximum variation was noticed for fruit yield in F_2 (565.5 to 1886) and F_3 (598.8 to 2836.1) followed by number of male flowers (F_2 41 to 169 and F_3 61.2 to 131.09) while minimum variation was noted fruit colour and sex ratio. On comparing the range of variation between F_2 and F_3 , it was noticed that the range narrowed down for anthesis of male and female flowers, number of male and female flowers, sex ratio and number of fruits per plant. There was no change in variation for fruit colour.

High PCV and GCV was observed for male flowers, female flowers, sex ratio, number of fruits per plant, fruit length, fruit weight, fruit yield per plant, coefficient of infection and fruit colour in both the generations. In conformity with Katiyar *et al* (1996), Prasad (2000) and Arunachalam (2002) in bittergourd.

High heritability coupled with high genetic advance was noticed for fruit weight, fruit yield per plant, coefficient of infection which indicated that the heritability is due to additive gene effects and selection hence may be effective as reported by Mangal *et.al.* (1981), Vahab (1989) and Arunachalam (2002).

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Table 1. Parents and crosses of bitter gourd genotypes selected for F_2 and F_3.

Resistant Genotypes	Susceptible Genotypes	Crosses.
IC 68335	Preethi	IC 68335 X Preethi
IC 68263 B	IC 68342 B	IC 68263 B X Preethi
IC 68250		IC68250 X IC 68342 B

Table 2. Variability in F_2 and F_3 generations of bittergourd (monordica cherantia L.).

Characters		Range	GCV (%)	PCV (%)	Heritability (Broad Sense)	Genetic Advance
Anthesis of male flower	F_2	34 to 52	8.94	9.00	98.7	7.88
	F_3	34.6 to 43	5.63	7.66	54.0	3.41
Anthesis of female flowers	F_2	40 to 60	9.11	9.27	96.6	8.71
	F_3	40.4 to 49.6	3.76	5.64	44.5	2.33
Number of male flowers	F_2	41 to 169	40.89	40.90	99.0	68.00
	F_3	61.2 to 131.09	23.81	24.33	95.8	42.10
Number of female flowers	F_2	12 to 35	26.04	26.23	98.6	10.25
	F_3	8.75 to 26.08	27.03	27.22	98.6	9.70
Sex Ratio	F_2	0.116 to 0.479	42.00	42.14	99.3	0.23
	F_3	0.089 to 0.345	34.19	34.59	97.7	0.15
Number of fruits per plant	F_2	9 to 31	28.07	28.23	98.9	9.57
	F_3	7.48 to 23.17	29.21	24.49	98.1	8.89
Fruit length	F_2	4.5 to 10.55	36.85	36.96	99.4	7.30
	F_3	8.31 to 21.8	25.74	26.21	96.4	8.23
Fruit girth	F_2	3.95 to 10.2	25.50	25.64	98.9	3.64
	F_3	10.435 to 13.66	6.29	8.31	57.3	1.17
Fruit weight	F_2	30.5 to 144.6	45.69	45.71	99.9	73.49
	F_3	55.78 to 179.25	38.02	38.24	98.3	78.83
Fruit yield per plant	F_2	565.78 to 1886	47.40	47.50	99.6	1056.89
	F_3	598.8 to 2836.1	54.53	54.72	99.3	1694.24
Coefficient of infection	F_2	4.8 to 77.9	109.71	109.87	99.7	48.85
	F_3	6.4 to 88.0	107.70	109.40	97.0	58.44
Fruit colour	F_2	1.5 to 3.8	25.52	26.05	96.0	1.34
	F_3	1.5 to 3.8	35.36	36.49	93.9	1.74

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